NEW METHODS OF PREPARING FISHES FOR MUSEUM EXHIBIT

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Paper presented before the Fourth International Fishery Congress held at Washington, U. S. A., September 22 to 26, 1908

BULLETIN OF THE BUREAU OF FISHERIES : : : : : VOL. XXVIII, P. 1357-1363
Document No. 724 : Issued May, 1910

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The three essential characters in a fish specimen perfectly prepared for museum exhibition are accuracy of form and detail, durability, and lifelike coloring. As none of these features are assured by the old methods of casting and mounting this class of specimens, the result has never proved entirely satisfactory to those desiring a high class of work. Indeed, much experimenting and a study of the various methods of mounting fishes convinced me that perfect work was impossible; serious shrinkage is inevitable and a mounted fishskin represents nothing more than an inferior surface for painting. Plaster casts from molds of the same material have the advantage of more accuracy of form, but the preparation of the mold for casting and the defective plastic quality of even very thin plaster is accentuated in the cast, with the result of a lamentable lack of fine definition of detail. Besides, being extremely fragile, such casts are a constant source of annoyance, and when even slightly broken their value is seriously impaired, if not totally destroyed.

One of the most difficult problems has been the painting of such specimens. In a mounted fish the use of white lead is necessary to overcome the discoloration due to the chemical action of preservatives; and, while the lead may be eliminated in casts, the result is invariably flat and lacks the depth and brilliancy of colors so essential to a representation of life. Coloring, however, must of necessity remain in the hands of the artist to whom the work is assigned, and I will but outline the several advantages the here-described methods present for overcoming the chief difficulties.

Briefly, this is the opportunity to discard the use of lead entirely; there is necessity for using only the slightest stain to obtain the desired colors, thus securing their full transparency and brilliancy while at the same time preserving the minute detail which is invariably lost by the use of lead or heavy color.

In experimenting for an improvement in fishes for exhibition, the cost of production has been kept in mind, and at the same time an opportunity for

more advantageous field work. Those familiar with the difficulties of securing fresh specimens will appreciate the benefits to be derived through the possibility of preparing specimens in the field, and, though some of the materials are more expensive than those used in the old methods, the saving of time and labor more than compensates for the difference.

These methods are equally applicable in the preparation of reptiles and batrachians. Specimens so treated readily admit of close inspection with the magnifying glass; therefore, their value is enhanced through the opportunity presented for scientific study.

While I do not recommend plaster casts, except for some of the large fishes and reptiles, the obvious superiority of glue molds over those of any other material, when such casts are desired, should be so apparent that mention of their several distinct advantages is hardly necessary.

I. WAX CASTS FROM GLUE MOLDS.

The peculiar plasticity and toughness of glue makes it a singularly desirable material for molds if either plaster or wax casts are desired, as it takes an exact impression of the most intricate detail or undercut, and when withdrawn retains its perfect negative form. Being softer than wax, when the slight shrinkage of the latter takes place the glue prevents the cracking and damage to definition so noticeable when hard molds are employed. The process in detail is as follows:

White glue is first softened by soaking in water; then the latter is drained off and the glue melted slowly and thickened somewhat by cooking in a double boiler or water bath. When sufficiently cool almost to permit immersing the hand without discomfort, the glue is in proper condition for flowing. Pose the fish by laying flat on some solid base, and build potters' clay about the side until the desired position is obtained. The clay immediately beneath the fins and tail should be smooth and at a height sufficient to permit the latter to be distended upon it, where, if necessary, they may be made secure by the use of insect pins. After applying over the entire surface of the fish a very thin coat of stearin dissolved in kerosene, carefully wipe with a soft cloth to remove any excess of oil.

A clay dam is now constructed about the specimen to the height of an inch or two above the highest point of the latter, and an equal distance from its outer edge; then the glue may be flowed. The glue should be poured directly upon the specimen, but very slowly, otherwise air spaces may occur. This is allowed to stand for a few hours, or until thoroughly chilled, when the clay dam may be removed and an inch of plaster spread over the entire surface of the mold. This acts as a "case" and holds the mold in its proper form during the later stages of the work.

Take the mold from the case, and, by slight manipulation, the specimen is removed without damage to either. Thoroughly work talcum powder into the mold, with a soft brush, to remove the oily surface, and immerse in a 5 per cent solution of formalin (measuring the latter as if 100 per cent) for five minutes. The surface of the glue is thus hardened, and only requires a few minutes in water, heated to a temperature of about 100° F., to prevent a too sudden chilling of the wax. Remove the excess of water with a soft sponge, and, after quickly applying a very thin coat of oil, the mold is ready for filling.

The transparency of the specimen must govern the composition of the wax for casting, but the following formula will prove generally useful. Melt in the double boiler one pound of paraffin to four pounds of bleached beeswax, to which add one teaspoonful of Canada balsam, or Venetian turpentine, to each pound of wax. Color with oil, tube colors, to the lightest tint of the ground color of the specimen.

As the fins and tails of fishes need strengthening, fill the mold and, after allowing it to stand a minute or two, empty it of all the wax except the thin film which will have formed over the surface, and while still hot press a single thickness of bolting cloth along the fins and tail; also add a silk covered wire at the spines, dashing a small quantity of wax over all to keep in position, when the mold should be again filled. The entire cast may be given additional strength by applying one or two coats of the cloth over the entire surface.

The principal care to be exercised in this work is in the flowing of the wax. There should be no splashing and the stream should be steady and constant, otherwise "water marks" and other possible defects will result.

Haste to remove the cast from the mold should be avoided, and under no circumstances should artificial means for cooling be employed, but the mold should be allowed to stand undisturbed until the wax is cold.

In pouring the wax into molds that present deep depressions or offsets, it is often necessary to resort to tilting or rolling the mold to insure the proper filling, and this should be done as the wax is deposited. It is advisable after such a mold is full to pour out a part of the wax and turn the mold at various angles to remove possible air bubbles, after which it is refilled.

In most instances the mold is easily taken from about the cast; but when deep undercuts are present the glue can be removed by cutting away in small sections or, more often, by merely splitting down the center. This is recommended where there are delicate parts which need care. A saving of material may be accomplished by inserting a rough form of wood and filling the intervening space with melted wax.

With fishes presenting a strong contrast of color, excellent results are obtained by tinting wax the several colors represented and applying each in its relative position with a soft brush. To do this properly, the mold must

first be immersed in water slightly warmer than the temperature mentioned. In no circumstances attempt to brush the wax on, but fill the brush and dab it on with one stroke of the end of the bristles, repeating until the surface is well coated, when the cloth and wire may be added as above described.

II. PLASTER CASTS FROM GLUE MOLDS.

When plaster casts are desired, the mold is prepared and treated as in wax casting, except that the warm-water bath may be omitted. With a soft brush work the thinly mixed plaster into every part of the mold until a coat has been applied to the entire surface.

While this coating is in a semisoft condition, dip white mosquito netting into thin plaster and lay on one or two thicknesses to increase the strength of the cast. The addition of burlap treated in the same manner will greatly assist in reducing the weight of such specimens. During warm weather it is advisable to inject and wash the specimen with formalin before posing, to prevent the quick decomposition likely to follow the application of the warm glue. As a further precaution the cooling process may be hastened by artificial means.

III. FISHES IN COPPER, FROM WAX MOLDS BY ELECTROPLATING PROCESS.

The most difficult part of the work of preparing fishes is the reproduction of their silver and iridescent colors. Metal "leaf" and washes produce but a slight resemblance to the original, and the resultant loss of detail and final discoloration of parts so treated emphasizes the necessity of preparing the highly metallic colored specimens in a manner whereby these difficulties may be avoided.

Some of the iridescent tints are imitated by the use of prismatic colors, but a white silver, or the various shades of this metal, as seen in the color of fishes, are possible only through a solid silver base.

Leaf and metal washes are not only dull in color, but are greatly darkened through the refraction of light, and it is impossible to secure brilliant effects by their use. The below-described method overcomes these difficulties, and such specimens are not only accurate of form and detail, but are durable.

The fish is posed as for glue molds, except the clay dam and coating of oil, which are omitted. The proportion of two pounds of paraffin to two pounds of bleached beeswax is melted in the double boiler and one tablespoonful of Canada balsam added to that quantity. Best results in flowing the wax are obtained by beginning at the tail with sufficient wax in a dipper (or other easily handled vessel) to insure a speedy and complete covering of the entire specimen. Allow the excess of wax to flow off and repeat several times at intervals, when a layer of absorbent cotton is spread on and saturated with the wax. In this

way a half-inch mold is built up. When it is cold, cut away all the wax about one inch outside the line of fins and tail, and apply a thin plaster case.

The fish is removed by gentle manipulation or possibly dissection, after which the mold is thoroughly cleansed by the use of a very soft brush and cold water and allowed to dry.

As pamphlets giving a complete description of copperplating are easily obtained, repetition on this subject is unnecessary here. The work does not require the services of an expert, and anyone of ordinary mechanical skill can arrange the apparatus and follow the simple directions.

When a substantial layer of copper has been deposited, the case is broken away and the wax mold removed by immersing in boiling water. After cutting and grinding away the excess of copper about the edges of the model by the use of an emery wheel or coarse file, bring the fins and tail down to a thin edge by the same method, and finish the outline with very fine files.

The model is then given a very thin plating of pure silver. This plating gives not only the full whiteness of the metal but permits of a variety of delicate shading and obviates the necessity for the use of white lead in coloring.

At first glance this method may appear too expensive for practical purposes, but with the electroplating performed by the preparator, it will prove of less cost than some of the methods now in use.